11.9–2 ACCURATE MEASUREMENT OF THERMAL NEUTRON PROPAGATION IN MOVING MATTER. By U. Bonse and A. Rumpf
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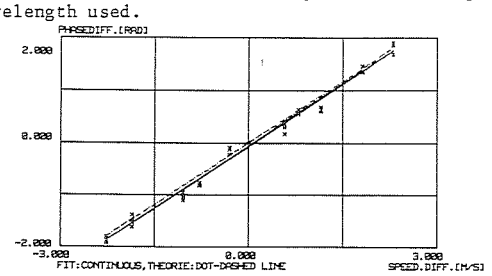
We rotated a cross-shaped AL phase shifter plate in a new interferometer of special design in such a way that the four wings of the cross engaged simultaneously in the beams, with the sense of movement being opposite in path I and II of the interferometer. Interference fringes patterns were generated by rotating a Ta phase shifter plate in the usual way. The phase shift of fringes was measured as function of the wing velocity and found to be in good agreement (Fig. 1) with shifts calculated from a theory based on assuming the dispersion law $1-n = 2\pi N b_c/k^2$ for thermal neutrons with the scattering length b_c independent of the wave vector K (N is the volume concentration of nuclei). Our experiment complements that of Klein, Opat, Cimmino, Zeilinger, Treimer and Gähler (Phys. Rev. Lett. 46 (1981, 1551) who measured the effect for cold neutrons, however with much lower accuracy namely 17 % to 1.5 % in our case. A major part of the uncertainty in the experiment of Klein et al. is lack of precise knowledge of the wavelength used.

Fig.1



11.9–3 NEUTRON AND γ-DIFFRACTION ON THE SANIDINE FROM VOLKESFELD/EIFEL.
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Sanidines are feldspars (K,Na) (Si_3AlO_8) with the space group C 2/m. The Si/Al-atoms occupy two sites T1 and T2 with more or less disorder. The change in optic angle indicates the degree of order/disorder. Another indirect measure for the Si/Al order is the averaged bond length between the tetrahedral sites and the surrounding oxygens. X-ray diffraction does not allow direct determination of the Si/Al order since the scattering factors of Si and Al are so similar. In contrast, the neutron scattering length of Si is about 20% greater than that of Al. Neutron diffraction analysis was performed to verify the correlation between optic angle and Si/Al order.
Sanidines from the Eifel/Germany show an anomalous velocity of ordering/disordering when annealed at temperatures between 650°C and 1050°C. This property decreases if there is a pre-treatment at other temperatures (Zeipert, Chr. and Wondratschek,H.; N. Jb. Mineral. (1981)408). The sanidines from Volkesfeld were found as large single-crystals up to more than 10 kg. They are optically and chemically very homogeneous, even after anealing. The mosaic distribution of the crystals was studied by means of γ-diffraction. The excellent perfection and homogeneity, compared with other feldspars, was e.g. demonstrated by measurements over a plate of 15*10*1 cm^3 (Schneider, J.R.; Fortschr. Miner. 61 (1983) 85). Further investigations showed, that the perfection decreases with annealing.